

CLAIMS

What is claimed is:

1 1. A process for increasing the production of camptothecins by a
2 plant comprising the step of:
3 physically, biologically, or ecologically controlling the amount of
4 hormones produced by the plant.

1 2. The process as defined in Claim 1 wherein said physical,
2 biological, or ecological control of the amount of hormones produced by the plant
3 includes reducing the amount of auxin produced by the plant.

1 3. The process as defined in Claim 2 wherein the amount of said
2 auxin produced by the plant is reduced by removing those sites of the plant which
3 produce said auxin.

1 4. The process as defined in Claim 3 wherein the removal of said
2 sites of the plant which produce said auxin is accomplished by first pruning during a first
3 year of plant growth and then periodically harvesting young vegetative tissues from the
4 plant during a second and subsequent years of plant growth.

1 5. The process as defined in Claim 4 wherein said pruning during
2 said first year of plant growth further includes stem pruning four times during said first
3 year of plant growth.

1 6. The process as defined in Claim 5 wherein said stem pruning
2 includes:
3 a first pruning after the last frost,
4 a second pruning about 12 to 20 weeks after said first pruning,
5 a third pruning about 8 to 12 weeks after said second pruning,
6 a fourth pruning after the last frost at the end of said first year of plant
7 growth.

1 7. The process as defined in Claim 6/further including root pruning
2 during said second year of plant growth, said root pruning further including:
3 a first pruning of about 1/3 of the roots;
4 a second pruning of about 1/3 of the roots about five weeks after said first
5 pruning of about 1/3 of the roots;
6 a third pruning of about 1/3 of the roots about five weeks after said second
7 pruning of about 1/3 of the roots.

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1 8. The process as defined in Claim 6 wherein:
2 said first pruning includes heading back young stems to less than about
3 50 cm. from the ground;
4 said second pruning includes heading back stems with a cut angle less than
5 about 30° from the main stem of the plant to about 50 cm. from the ground, heading back
6 those stems between about 30° and about 70° from the main stem to the third bud from
7 the stem tip;
8 said third pruning includes heading back stems with angles less than about
9 30° from the vertical to about 50 cm. from the ground, heading back the stems between
10 about 30° and about 70° from the main stem to the third bud from the stem tip;
11 said fourth pruning includes heading back stems with angles between
12 about 30° and about 70° from the main stem to the third bud from the stem tip.

1 9. The process as defined in Claim 7 further including the step of
2 pinching off about 10% to about 30% of the leaf area at the tip of the leaf of about 20% to
3 about 60% of all the leaves on each stem at the same time as each of said root prunings
4 during said first or subsequent years of plant growth.

1 10. The process as defined in Claim 4 wherein said periodic harvesting
2 of young vegetative tissues is accomplished at about two to four week intervals during
3 said second and subsequent years of plant growth.

1 11. The process as defined in Claim 10 wherein said periodic
2 harvesting of young vegetative tissues is accomplished about 10 to 12 times per year of
3 plant growth.

1 12. The process as defined in Claim 4 wherein said young vegetative
2 tissues are between about 3 to about 20 days old.

1 13. The process as defined in Claim 12 wherein about 10% to about
2 30% of the leaf area at the tip of the leaf of about 20% to about 60% of all the leaves on
3 each stem is pinched off at least about 6 to about 8 days before each harvest of young
4 vegetative tissues.

1 14. A process for increasing the production of camptothecins by a
2 plant comprising the step of:

3 increasing the formation of camptothecins-bearing trichomes on young
4 vegetative tissues of the plant by physically, biologically, or ecologically controlling the
5 amount of hormones produced by the plant.

1 19. The process as defined in Claim 18^v wherein said stem pruning
2 includes:
3 a first pruning after the last frost,
4 a second pruning about 12 to 20 weeks after said first pruning,
5 a third pruning about 8 to 12 weeks after said second pruning,
6 a fourth pruning after the last frost at the end of said first year of plant
7 growth.

1 20. The process as defined in Claim 19 further including root pruning
2 during said second year of plant growth, said root pruning further including:
3 a first pruning of about 1/3 of the roots;
4 a second pruning of about 1/3 of the roots about five weeks after said first
5 pruning of about 1/3 of the roots;
6 a third pruning of about 1/3 of the roots about five weeks after said second
7 pruning of about 1/3 of the roots.

1 21. The process as defined in claim 19 wherein:
2 said first pruning includes heading back young stems to less than about
3 50 cm. from the ground;
4 said second pruning includes heading back stems with a cut angle less than
5 30° from the main stem of the plant to about 50 cm. from the ground, heading back those
6 stems between about 30° and about 70° from the main stem to the third bud from the
7 stem tip;
8 said third pruning includes heading back stems with angles less than 30°
9 from the vertical to about 50 cm. from the ground, heading back the stems between about
10 30° and 70° from the main stem to the third bud from the stem tip;
11 said fourth pruning includes heading back stems with angles between
12 about 30° and about 70° from the main stem to the third bud from the stem tip.

1 22. The process as defined in Claim 20 further including the step of
2 pinching off about 10% to about 30% of the leaf area at the tip of the leaf of about 20% to
3 about 60% of all the leaves on each stem at the same time as each of said root prunings
4 during said first or subsequent years of plant growth.

1 23. The process as defined in Claim 17 wherein said periodic
2 harvesting of young vegetative tissues is accomplished at about two to four week
3 intervals during said second and subsequent years of plant growth.

1 24. The process as defined in Claim 23 wherein said periodic
2 harvesting of young vegetative tissues is accomplished about 10 to 12 times per year of
3 plant growth.

1 25. The process as defined in Claim 17 wherein said young vegetative
2 tissues are between about 3 to about 20 days old.

1 26. The process as defined in Claim 25 wherein about 10% to about
2 30% of the leaf area at the tip of the leaf of about 20% to about 60% of all the leaves on
3 each stem is pinched off at least about 6 to about 8 days before each harvest of said
4 young vegetative tissues.

1 27. A process for increasing the production of camptothecins by a
2 plant comprising the steps of:
3 increasing the amount of young vegetative tissues produced by the plant;
4 increasing the formation of camptothecins-bearing trichomes on said
5 increased amount of said young vegetative tissues by physically, biologically, or
6 ecologically controlling the amount of hormones produced by the plant.

1 28. The process as defined in Claim 27 wherein said physical,
2 biological, or ecological control of the amount of hormones produced by the plant
3 includes reducing the amount of auxin produced by the plant.

1 29. The process as defined in Claim 28 wherein the amount of said
2 auxin produced by the plant is reduced by removing those sites of the plant which
3 produce said auxin.

1 30. The process as defined in Claim 29 wherein both the removal of
2 those sites of the plant which produce auxin and increasing the amount of young
3 vegetative tissues produced by the plant is accomplished by first pruning during a first
4 year of plant growth and then periodically harvesting young vegetative tissues from the
5 plant during a second and subsequent years of plant growth.

1 31. The process as defined in Claim 30 wherein said pruning during
2 said first year of plant growth further includes stem pruning four times during said first
3 year of plant growth.

1 32. The process as defined in Claim 31 wherein said stem pruning
2 includes:
3 a first pruning after the last frost,
4 a second pruning about 12 to 20 weeks after said first pruning,
5 a third pruning about 8 to 12 weeks after said second pruning,
6 a fourth pruning after the last frost at the end of said first year of plant
7 growth.

1 33. The process as defined in Claim 32 further including root pruning
2 during said second year of plant growth, said root pruning further including:
3 a first pruning of about 1/3 of the roots;
4 a second pruning of about 1/3 of the roots about five weeks after said first
5 pruning of about 1/3 of the roots;
6 a third pruning of about 1/3 of the roots about five weeks after said second
7 pruning of about 1/3 of the roots.

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1 34. The process as defined in claim 32 wherein:
2 said first pruning includes heading back young stems to less than about
3 50 cm. from the ground;
4 said second pruning includes heading back stems with a cut angle less than
5 about 30° from the main stem of the plant to about 50 cm. from the ground, heading back
6 those stems between about 30° and about 70° from the main stem to the third bud from
7 the stem tip;
8 said third pruning includes heading back stems with angles less than about
9 30° from the vertical to about 50 cm. from the ground, heading back the stems between
10 about 30° and about 70° from the main stem to the third bud from the stem tip;
11 said fourth pruning includes heading back stems with angles between
12 about 30° and about 70° from the main stem to the third bud from the stem tip.

1 35. The process as defined in Claim 33 further including the step of
2 pinching off about 10% to about 30% of the leaf area at the tip of the leaf of about 20% to
3 about 60% of all the leaves on each stem at the same time as each of said root prunings
4 during said first or subsequent years of plant growth.

1 36. The process as defined in Claim 30 wherein said periodic
2 harvesting of said young vegetative tissues is accomplished at about two to four week
3 intervals during said second and subsequent years of plant growth.

1 37. The process as defined in Claim 36 wherein said periodic
2 harvesting of said young vegetative tissues is accomplished about 10 to 12 times per year
3 of plant growth.

1 38. The process as defined in Claim 30 wherein said young vegetative
2 tissues are between about 3 to about 20 days old.

1 39. The process as defined in Claim 38 wherein about 10% to about
2 30% of the leaf area at the tip of the leaf of about 20% to about 60% of all the leaves on
3 each stem is pinched off at least about 6 to about 8 days before each harvest of said
4 young vegetative tissues.

1 40. A process for increasing the amount of camptothecins-bearing
2 trichomes harvested from a plant comprising the steps of:
3 increasing the amount of young vegetative tissues produced by the plant;
4 increasing the formation of camptothecins-bearing trichomes on said
5 increased amount of young vegetative tissues;
6 reducing the amount of camptothecins-bearing trichomes falling away
7 from said young vegetative tissues after the harvesting of the young vegetative tissues.

1 41. The process as defined in claim 40 wherein said amount of
2 camptothecins-bearing trichomes falling away from said young vegetative tissues is
3 reduced by processing said young vegetative tissues within about two days after
4 harvesting.

1 42. The process as defined in claim 40 wherein the amount of said
2 camptothecins-bearing trichomes falling away from said young vegetative tissues is
3 reduced by freezing said young vegetative tissues shortly after harvesting.

1 43. A process for increasing the amount of camptothecins harvested
2 from a plant which includes camptothecins-bearing trichomes comprising the steps of:
3 increasing the amount of young vegetative tissues produced by the plant;
4 increasing the formation of camptothecins-bearing trichomes on said
5 increased amount of young vegetative tissues;
6 reducing the number of camptothecins-bearing trichomes falling away
7 from the young vegetative tissues after the harvesting of the young vegetative tissues;
8 breaking said trichome walls to release the camptothecins with the
9 camptothecins-bearing trichomes.

1 44. The process as defined in claim 43 wherein said trichome walls are
2 broken using ultrasound.

1 45. The process as defined in claim 43 wherein said trichome walls are
2 broken using a homogenizer.

1 46. The process as defined in claim 43 wherein said trichome walls are
2 broken by a physical impact on said trichome walls.

1 47. The process as defined in claim 43 wherein said camptothecins are
2 collected in a solvent.